

Cooke Hydroelectric Plant, North Embankment  
Cooke Dam Road at the Au Sable River  
Oscoda Vicinity  
Iosco County  
Michigan

HAER No. MI-98-A

HAER  
MICH  
35-OSCO.V  
1A-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record  
National Park Service  
Mid-Atlantic Regional Office  
Department of the Interior  
143 South Third Street  
Philadelphia, PA 19106

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HISTORIC AMERICAN ENGINEERING RECORD  
COOKE HYDROELECTRIC PLANT, North Embankment

HAER No. MI-98-A

Location: Cooke Dam Road at the Au Sable River  
Oscoda Vicinity  
Iosco County, Michigan

UTM: 17:295490:4927510 (north end)  
17:295450:4927400 (south end)  
Quad: Sid Town, Mich., 1:24,000

Date of  
Construction: 1911

Engineer: William G. Fargo, Fargo Engineering Company, Jackson, Michigan

Present

Owner: Consumers Power Company  
212 West Michigan Avenue, Jackson, Michigan 49201

Present Use: Dam for hydroelectric generating plant

Significance: The North Embankment is part of a semi-hydraulic fill dam of the Cooke Hydroelectric Plant, which impounds water for use in generating electric power. The dam was designed by William G. Fargo of Jackson, Michigan, a civil engineer who helped pioneer the hydraulic-fill construction method in the Midwest. When the plant went on line in 1912, it set a new record for transmission voltage.

Project

Information: This documentation was prepared by Consumers Power Company (CPCo) in conformance with its Cultural Resources Management Plan for the Au Sable River Hydroelectric Projects (July 1995). The plan stipulated the recordation of the entire Cooke Hydroelectric Plant (according to the standards of the Historic American Engineering Record) as mitigation for the planned rehabilitation of the plant's concrete spillway. The documentation was completed in 1996 by Hess, Roise and Company of Minneapolis under contract with CPCo. Jeffrey A. Hess served as Principal Investigator and Cynthia de Miranda as Project Historian. Project photography was completed under a subcontract with Hess Roise by Clayton B. Fraser of Loveland, Colorado.

## PHYSICAL DESCRIPTION

The dam at the Cooke Hydroelectric Plant on the Au Sable River consists of two sections of earthen embankments, with an intervening Powerhouse (HAER No. MI-98-C) and Spillway (HAER No. MI-98-B). Together, these structures form a "V"-shaped impediment which points upstream (west). Cooke's 572'-0" North Embankment, by far the longer dam section, rises about 54' above a natural clay foundation and sits between the river's north bank and the plant's Spillway. The smaller South Embankment (HAER No. MI-98-E) combines with the Powerhouse and Spillway to compose the southern arm of the facility.

The North Embankment displays a roughly trapezoidal cross-section, rising from a wide base to a narrower, flat peak. The flat top of the dam is 12'-0" wide; from the apex, both the upstream and downstream sides descend at a slope of 2:1. On the upstream (west) side, the descent is interrupted after about 3' by an 8'-3" wide berm created when Consumers Power Company raised the height of the embankment in 1925. The concrete corewall forms the upstream side of the berm. Below it, the embankment's slope descends toward the riverbed at a 4:1 grade. The grade of the downstream (east) side also changes from 2:1 to a more shallow 4:1 about 14' from the top of the dam. Grass covers the embankment above the water level, and a wooden staircase just north of the spillway serves as a canoe portage.<sup>1</sup>

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<sup>1</sup> This description is based on a site survey completed by the authors on 27 July 1995 and on an engineering drawing of the dam. See Commonwealth Power Corporation for Consumers Power Company, "Cooke Dam—Raise Head, Corewall, etc., 1925," Drawing M28-F1005, Corporate Archives, Consumers Power Company, Bridge Street, Jackson, Michigan.

## HISTORY

William G. Fargo of Fargo Engineering Company, Jackson, Michigan, designed the Cooke dam for Consumers Power Company. Fargo, a civil and hydraulic engineer who specialized in building dams on soil foundations, had worked with J.B. Foote, Consumers' chief electrical engineer, on a number of facilities by the time construction began at Cooke.<sup>2</sup> For this site, Fargo designed an earthen embankment with a poured, reinforced concrete corewall imbedded just upstream (west) of the dam's midsection. The dam is often characterized as a semi-hydraulic fill embankment, a name that refers to its method of construction.<sup>3</sup>

Semi-hydraulic fill dams are constructed by first carting earthen building material, known as fill, to the dam site from a borrow pit. High-pressure jets of water aimed at the fill move it into place at the core of the dam. This process also segregated the material by weight. Heavier fill particles separate first from the stream of water while the smaller, lighter particles settle toward the center of the embankment. This arrangement—a core of small particles surrounded by larger, coarser ones—makes the center of the dam more impervious to water while allowing drainage through the coarser outside layers. The corewall also helps prevent saturation of the dam.<sup>4</sup>

Earthen dams were not unusual at the time of Cooke's construction, but the hydraulic and semi-hydraulic fill methods were relatively new. The use of water to place dam materials, an adaptation of placer mining techniques, had been developed around the turn of the century.<sup>5</sup> Fargo helped pioneer hydraulic fill construction in the Midwest.<sup>6</sup>

Work on the Cooke Hydroelectric Plant began in autumn 1909. Consumers Power Company took advantage of an existing sixteen-mile, narrow-gauge logging railroad to have machinery and building materials delivered to the site from Au Sable, the nearest town. A timber diversion crib

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<sup>2</sup> See Charles K. Hyde, "Croton Hydroelectric Plant, Dam," HAER No. MI-81-A, 1994, Historic American Engineering Record/Historic American Building Survey Collection, Library of Congress, Washington, D.C., on the semi-hydraulic fill earth dam built at Croton. Fargo is listed in John William Leonard, *Who's Who in Engineering 1922-1923* (New York: John Leonard Corporation, 1922), 425-426.

<sup>3</sup> For an extensive contemporary account of the construction methods used at the Cooke site, see "The Design and Methods Employed in Construction the Cooke Water Power Plant on the Au Sable River in Michigan," *Engineering and Contracting* 37 (5 June 1912): 639-644.

<sup>4</sup> Duncan Hay, *Hydroelectric Development in the United States: 1880-1940* (Washington, D.C.: Edison Electric Institute, 1991), 53-54.

<sup>5</sup> Placer mining involves panning, dredging, or sluicing to extract ores or minerals that have accumulated in stream beds.

<sup>6</sup> Hay, 53 and Hyde, 2.

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built across the river channel restricted the Au Sable's flow to the north end of its natural channel, near the river's north bank. Crews used a drag-line excavator to clear the site in preparation for construction. They also felled trees in the area to build 90'-high railroad trestles across the river channel to aide in the transport of materials.

Early in 1911, crews poured concrete for the Spillway (HAER No. MI-98-B) in midriver, thus providing a new channel for the Au Sable's flow. With the remainder of the riverbed clear of water, workers poured the North Embankment's 12"-thick reinforced corewall in sections, working from the Spillway toward the north bank. By September of that year, railroad cars began hauling fill onto the trestle so that it could be dumped and sluiced it into place. The dam rose above the clay riverbed, slowly burying the railroad trestles in the process.

The North Embankment continues to serve its original function of impounding water in the Au Sable River. The only significant change to Cooke's North Embankment and its corewall occurred in 1925, when Consumers Power Company added fill to the dam to increase its height by 3'-9". At the same time, the Company appended a 2'-0" cap to the corewall to accommodate an equal increase in the headwater elevation.<sup>7</sup>

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<sup>7</sup> Commonwealth Power Corporation for Consumers Power Company, "Cooke Dam—Raise Head, Corewall, Etc., 1925," Drawing M28-F1005, Corporate Archives, Consumers Power Company, Bridge Street, Jackson, Michigan.

## SOURCES OF INFORMATION

### ENGINEERING DRAWING

Commonwealth Power Corporation for Consumers Power Company. "Cooke Dam—Raise Head, Corewall, etc., 1925." Drawing M28-F1005. Corporate Archives, Consumers Power Company, Bridge Street, Jackson, Michigan.

### HISTORIC VIEWS

Cooke Hydroelectric Plant construction and overview photographs. Hydro Operations, Consumers Power Company, Cadillac, Michigan.

### MANUSCRIPT SOURCES

Hyde, Charles K. "Croton Hydroelectric Plant-Dam." HAER No. MI-81-A, 1994. Historic American Building Survey/Historic American Engineering Record Collection, Library of Congress, Washington, D.C.

### PUBLISHED SOURCES

"140,000-Volt Power Transmission." *Engineering News* 67 (16 May 1912): 912-917.

"The Design and Methods Employed in Constructing the Cooke Water Power Plant on the Au Sable River in Michigan." *Engineering and Contracting* 37 (5 June 1912): 639-644.

Hay, Duncan. *Hydroelectric Development in the United States: 1880-1940*. Washington, D.C.: Edison Electric Institute, 1991.